G2 cont

wherein the $Si_{1-x}Ge_x$ channel region [is formed subsequent to formation of the gate oxide.] has a channel length less than 7μm.

Sub H3

25. (Thrice amended) A p-channel metal-oxide-semiconductor transistor formed on a silicon substrate, comprising:

G3

a $Si_{1-x}Ge_x$ channel region, having a germanium molar fraction of x, and formed in the substrate, underneath a gate oxide and between a source region and a drain region without a silicon layer interposed between the $Si_{1-x}Ge_x$ channel region and the gate oxide;

wherein the $Si_{1-x}Ge_x$ channel region is formed from ion implanting germanium (Ge) into the substrate at a dose of approximately 2×10^{16} atoms/cm^2, and wherein the Ge is implanted at an energy of approximately 20 to 100 keV; and

wherein the $Si_{1-x}Ge_x$ channel region [is formed subsequent to formation of the gate oxide.] has a channel length less than 7μm.

Sub H4

28. (Four times amended) A p-channel metal-oxide-semiconductor transistor formed on a silicon substrate, comprising:

G4

a $Si_{1-x}Ge_x$ channel region, having a germanium molar fraction of 0.2, and formed in the substrate, underneath and adjoining a gate oxide and between a source region and a drain region;

wherein the $Si_{1-x}Ge_x$ channel region [is formed subsequent to formation of the gate oxide.] has a channel length less than 7μm.

30. (Four times amended) A p-channel metal-oxide-semiconductor transistor on a silicon substrate, wherein the transistor includes a channel comprising a silicon-germanium (Si-Ge) alloy underneath and adjoining a gate oxide, wherein the silicon-germanium alloy [is formed subsequent to formation of the gate oxide.] has a channel length less than 7μm.

G5

Sub H6

38. (Twice amended) A p-channel metal-oxide-semiconductor transistor, comprising:

G6

a silicon substrate;

a gate oxide, coupled to the substrate;

a gate, coupled to the gate oxide;

source/drain regions formed in the substrate on opposite sides of the gate; and

a $Si_{1-x}Ge_x$ channel region, having a germanium molar fraction of x, and formed in the substrate, underneath and adjoining the gate oxide and between the source/drain regions;

wherein the $Si_{1-x}Ge_x$ channel region [is formed from ion implanting germanium (Ge) through the gate oxide] has a channel length less than 7μm ; and

wherein the germanium molar fraction is less than about 0.6.

40. (Twice amended) A p-channel metal-oxide-semiconductor transistor formed on a silicon substrate, comprising:

a $Si_{1-x}Ge_x$ channel region, having a germanium molar fraction of x, and formed in the substrate, underneath and adjoining a gate oxide and between a source region and a drain region;

wherein the $Si_{1-x}Ge_x$ channel region [is formed from ion implanting germanium (Ge) through the gate oxide] has a channel length less than 7μm ; and

wherein the germanium molar fraction is less than about 0.6.

REMARKS

Applicant has carefully reviewed and considered the Office Action mailed on July 18, 2000, and the references cited therewith.

STATUS OF THE CLAIMS

Independent claims 11, 24, 25, 28, 30, 38, and 40 are amended; as a result, claims 11, 13-14, 24-28, 30-32, and 38-43 are now pending in this application.

SUMMARY OF THE INVENTION

The present invention is generally directed to a PMOS transistor that is formed in a CMOS integrated circuit, having a $Si_{1-x}Ge_x$/Si heterojunction between the channel region and the substrate. The method is applicable to large volume CMOS IC fabrication. Germanium is